





Protocols and Definitions Device-associated Module

Ventilator-associated Pneumonia (VAP)

Mary Andrus, BA, RN, CIC
Division of Healthcare Quality Promotion
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Target Audience

- This training session is designed for those who will collect and analyze Ventilator-associated Pneumonias in the Patient Safety Component of NHSN. This may include:
 - NHSN Facility Administrator
 - Patient Safety Primary Contact
 - Infection Control Professional (ICP)
 - Epidemiologist
 - Microbiologist
 - Respiratory Therapy Staff
 - Data entry staff

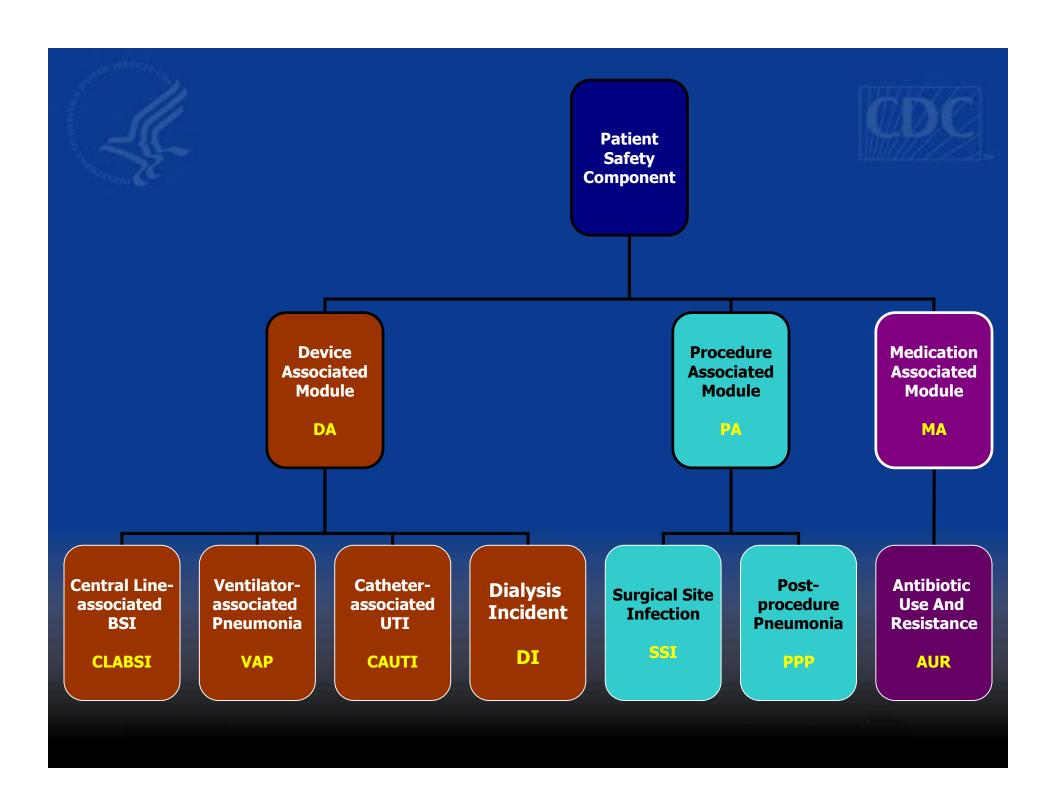


- Outline the structure, methodology and purpose of the Device-associated Module of NHSN
- Describe the protocols and definitions used in the VAP option within the Device-associated Module

http://www.cdc.gov/ncidod/dhqp/nhsn_members.html

Surveillance for DA HAI

- Active (vs. passive)
 - Trained ICPs look for and identify infections
 - Accumulate information from multiple data sources
- Patient-based (vs. laboratory-based)
 - Not based solely on laboratory data
 - Identification of risk factors, patient care procedures
- Prospective (vs. retrospective)
 - Monitor patients during their hospitalization when possible





Ventilator-associated Pneumonia

VAP

VAP

- Second most common HAI in the U.S.
- Patients with ventilators at high risk
- CDC/HICPAC Guideline for Prevention of Nosocomial Pneumonia
 - Recommends surveillance for bacterial pneumonia for trends and for interhospital comparison

http://www.cdc.gov/ncidod/dhqp/gl_hcpneumonia.html

Use CDC Definitions for the following:

- VAP
- Ventilator
- PNU1
- PNU2
- PNU3

Definition: VAP

- Pneumonia (PNEU) that occurs in a patient who was intubated <u>and</u> ventilated at the time of or within 48 hours before the onset of the pneumonia.
- If the PNEU develops in a patient within 48 hours of discharge from a location, indicate the discharging location on the infection report, not the current location of the patient

Definition: Ventilator

- A device to assist or control respiration continuously, inclusive of the weaning period, through a tracheostomy or by endotracheal intubation.
 - NOTE: Lung expansion devices such as intermittent positive-pressure breathing (IPPB); nasal positive end-expiratory pressure (PEEP); and continuous nasal positive airway pressure (CPAP, hypoCPAP) are not considered ventilators unless delivered via tracheostomy or endotracheal intubation (e.g., ET-CPAP)

Pneumonia Criteria

- Indicate the specific type of VAP*
 - PNU1 Clinically Defined Pneumonia
 - PNU2 Pneumonia with Common Bacterial Pathogens
 - PNU3 Pneumonia in Immunocompromised
 Patients



X-Ray findings

Patient with underlying diseases
has 2 or more serial X-rays with one
of the following:
New or progressive and
persistent infiltrate
Consolidation

Cavitation

Pneumatoceles, in <1 y.o.

Patient <u>without underlying diseases</u> has <u>1 or more serial X-rays</u> with <u>one</u> of the following:

New or progressive <u>and</u> persistent infiltrate

Consolidation

Cavitation

Pneumatoceles, in <1 y.o.

or

PNU1 – Clinically defined

Signs and Symptoms

At least one of the following:

- •Fever (> 38° C/100.4° F) with no other cause
- •Leukopenia (< 4,000 WBC/mm³) or leukocytosis (≥ 12,000 WBC/mm³)
- •Altered mental status with no other cause, in ≥ 70 y.o.

and

At least two of the following:

- •New onset of purulent sputum, or change in character of sputum, or ↑ respiratory secretions, or ↑ suctioning requirements
- •New onset or worsening cough, or dyspnea, or tachypnea
- •Rales or bronchial breath sounds
- •Worsening gas exchange (e.g., O2 desats [e.g., PaO₂/FiO₂ \leq 240], \uparrow O2 req, or \uparrow ventilation demand)

PNU2 – Specific laboratory findings



X-Ray findings

Patient with underlying diseases has 2 or more serial X-rays with one of the following:

New or progressive and persistent infiltrate

Consolidation

Cavitation

Pneumatoceles, in <1 y.o.

Patient <u>without underlying diseases</u> has <u>1 or more serial X-rays</u> with <u>one</u> of the following:

New or progressive <u>and</u> persistent infiltrate

Consolidation

Cavitation

Pneumatoceles, in <1 y.o.

or

PNU2 – Specific laboratory findings

Signs and symptoms

At least one of the following:

- •Fever (> 38° C/100.4° F) with no other cause
- •Leukopenia (< 4,000 WBC/mm³) <u>or</u> leukocytosis (≥ 12,000 WBC/mm³)
- •Altered mental status with no other cause, in ≥ 70 y.o.

And...

PNU2 – Specific laboratory findings

or

At least two of the following:

- •New onset of purulent sputum, or change in character of sputum, or ↑ respiratory secretions, or ↑ suctioning requirements
- New onset or worsening cough, or dyspnea, or tachypnea
- •Rales or bronchial breath sounds
- •Worsening gas exchange (e.g., O2 desats [e.g., PaO₂/FiO₂ ≤ 240], ↑ O2 req, or ↑ ventilation demand)

At least one of the following:

- •New onset of purulent sputum, or change in character of sputum, or ↑ respiratory secretions, or ↑ suctioning requirements
- •New onset or worsening cough, or dyspnea, or tachypnea
- •Rales or bronchial breath sounds
- •Worsening gas exchange (e.g., O2 desats [e.g., PaO₂/FiO₂ ≤ 240], ↑ O2 req, or ↑ ventilation demand)

and

At least <u>one</u> of the following: Positive blood culture not related to another infection

- ■Positive pleural fluid culture
- ■Positive quantitative culture from minimally contaminated LRT specimen (e.g., BAL or protected specimen brushing)
- ■≥ 5% BAL-obtained cells contain intracellular bacteria on direct microscopic exam
- ■Histopathologic exam shows <u>one</u> of the following:
 - •Abscess formation or foci of consolidation with intense PMN accumulation in bronchioles and alveoli
 - Positive quantitative culture of lung parenchyma
 - •Evidence of lung parenchyma invasion by fungal hyphae or pseudohyphae

At least one of the following:

- ■Positive culture of virus or Chlamydia from respiratory secretions
- ■Positive detection of viral antigen or antibody from respiratory secretions (e.g., EIA, FAMA, shell vial assay, PCR)
- ■4-fold rise in paired sera (IgG) for pathogen (e.g., Influenza viruses, *Chlamydia*)
- ■Positive PCR for *Chlamydia* or *Mycoplasma*
- ■Positive micro-IF test for *Chlamydia*
- ■Positive culture or micro-IF of Legionella spp from respiratory secretions or tissue
- ■Detection of *Legionella pneumophila* serogroup 1 antigens in urine by RIA or EIA
- ■4-fold rise in *L. pneumophila* antibody titer to ≥ 1:128 in paired acute and convalescent sera by indirect IFA

or

PNU2



or

X-Ray findings

Patient with underlying diseases
has 2 or more serial X-rays with one
of the following:
New or progressive and
persistent infiltrate

Consolidation

Cavitation

Pneumatoceles, in <1 y.o.

Patient <u>without underlying diseases</u> has <u>1 or more serial X-rays</u> with <u>one</u> of the following:

New or progressive <u>and</u> persistent infiltrate

Consolidation

Cavitation

Pneumatoceles, in <1 y.o.

and





Signs and symptoms

At least <u>one</u> of the following in an immunocompromised patient:

- **9** Fever (> 38° C/100.4° F) with no other cause
- **②** Altered mental status with no other cause, in ≥ 70 y.o.
- New onset of purulent sputum, or change in character of sputum, or respiratory secretions, or ↑ suctioning requirements
- **9** New onset or worsening cough, or dyspnea, or tachypnea
- Pales or bronchial breath sounds
- **9** Worsening gas exchange (e.g., O2 desats [e.g., PaO₂/FiO₂ \leq 240], \uparrow O2 req, or \uparrow ventilation demand)
- 9 Hemoptysis
- Pleuritic chest pain

and

PNU3 – Immunocompromised patient

Laboratory findings

At least one of following:

- Matching positive blood and sputum cultures with Candida spp
- □ Evidence of fungi or *Pneumocystis carinii* from minimally contaminated LRT specimen (e.g., BAL or protected specimen brushing) from <u>one</u> of the following:
 - •Positive culture of fungi
 - Direct microscopic exam

<u>or</u>

Any of the laboratory criteria from PNU2

PNU3

Acceptable Specimens for PNU2 and PNU3

- Quantitative culture from minimally contaminated LRT specimen
 - Obtained with or without bronchoscope
 - Bronchoalveolar lavage (BAL)
 - Protected specimen brushing
- Lung parenchyma
 - Open lung biopsy specimens
 - Immediate post-mortem specimens obtained by transthoracic or transbronchial biopsy

Example of Completed PNEU form



Pneumonia (PNEU) Form

Page 1 of 2

OMB No. 0920-0666

Exp. Date: 02-29-2008

* required for saving **required for completion *Facility ID#: 100000	*Event #: 141
*Patient ID#: 22655	Social Security #:
Secondary ID#:	3043/300/3003/300/X4012 H33/30
Patient Name, Last: Jones	First: Middle: John
*Gender: F M	*Date of Birth: 02/26/1955
*Event Type: PNEU	*Date of Event: 01/04/2006
*Post-procedure PNEU: Yes (No)	Date of Procedure: 01/12/2006
NHSN Procedure Code:	ICD-9-CM Procedure Code:
*Location: CCU	*Date Admitted to Facility:
Risk Factors	A Control of the American Control of the Control of
*Ventilator: Yes No *For NICU only: Birth weight:	grams
Event Details	
*Specific Event: X Clinically defined pneumonia (Pneumonia with specific labora Pneumonia in immunocompror *Secondary Bloodstream Infection: Yes No	atory findings (PNU2) mised patients (PNU3)
**Died: Yes No	PNEU Contributed to Death: Yes No
Discharge Date: 01/21/2006	*Pathogens Identified: Yes No

Pathogen Data

- List up to 3 pathogens for each PNEU identified (in rank order of importance)
- For each pathogen, complete information about antimicrobial susceptibilities
- Only certain bug/drug combinations are required but up to 20 drugs can be listed with susceptibilities

VAP Denominator Data



- At the same time each day, count
 - # patients (i.e., patient days)
 - # patients on ventilators



Denominators for Intensive Care Unit (ICU)/ Other locations (not NICU or SCA)

OMB No. 0920-0666 Exp. Date: 02-29-2008

Facility I	D#:		,					
Location		Month:	Month: Year:					
Date	Number of patients	Number of patients with 1 or more central lines	Number of patients with a urinary catheter	Number of patients on a ventilator				
1			•					
2								
3								
4								
5								
б								
7								
8								
9								
10		—II Record the	number of pat	ients ———				
11			•					
12			nber of patients	5 UII a				
13		— ventil	ator each day					
14			,					
15								
16				-				
17								
18								
19								
20								
21								

VAP Denominator Data for NICU



- At the same time each day, for each birthweight category, count
 - # patients on ventilators
 - # patients (i.e., patient days)
- Enter the totals within 30 days of the end of the month

Analysis: VAP Rate

- * Stratify by:
 - Type Location
 - NICU
 - Birthweight category

Analysis: Device Utilization (DU) Ratio

```
Ventilator = # Ventilator Days

DU Ratio # Patient Days
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DU Ratio measures the proportion of total patient-days in which ventilators were used



National Healthcare Safety Network

Rate Table for Ventilator-Associated PNEU Data for ICU-Other/SCA

As of: August 15, 2006 at 11:06 AM

Date Range: VAP_RATESICU_SCA summary YQ 2006Q1 to 2006Q1

Org ID=10000

		Pr						d	Density	•	Patient		Pooled I	•	Proportion
	Location	Ç٥	unt	Day		Rate	Mean		p-value	Percentile	Days	Ratio	Mean	p-value	Percentile
	2SOUTH	X	0	\mathbf{V}		X					503				
/	3 MS	/\	4	Y	509	7.9	V 5.	1	0.2579	83	1,819	0.28	0.37	0.0000	32
	BICU		1	Λ	203	4.9	12.	0	0.2996		50	0.40	0.31	0.0000	
	BURN		2	l)	199	10.1	12.	0	0.5715		386	0.52	0.31	0.0000	
	RICU		0	V	203	0.0	4.	9	0.3671		284	0.71	0.71	0.4423	
N	SICU	V	3	Λ	295	10.2	9.	3	0.5175	62	1,309	0.23	0.44	0.0000	11
	STROKE	X	0			\	\triangle		<u>/</u> .		563				





Questions?

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